

# Advanced Technologies for Coordinated In-Situ Atmospheric Sensing, Phase I

Completed Technology Project (2014 - 2014)



## Project Introduction

There is a great need for better understanding of the continuity of atmospheric processes on multiple scales ranging from several kilometers to the order of a meter. Although the general features of this process are well-established, they are poorly quantified. This lack of understanding leads to significant uncertainties in the parameterizations used in numerical models of weather prediction, pollution transport and diffusion, etc. Improvement of the models is heavily dependent upon available data, increasing the need for improved remote satellite and terrestrial based measurements as well as affordable, capable, and easily operated in situ measurement systems. The complementary nature of these two measurement techniques ensure that recent work toward the revolutionary use of unmanned aircraft systems for in situ measurements has the potential to greatly enhance data gathered through remote sensing and significantly affect the study of the atmospheric boundary layer. Black Swift Technologies proposes the creation, testing, and validation of a new in situ atmospheric sensing instrument, the Coordinated Atmospheric Profiling System (CAPS). This will be realized as a coordinated multi-aircraft system with each unmanned aircraft consisting of tightly integrated airframe, avionics and sensors specifically designed to measure atmospheric parameters (i.e., temperature, pressure, humidity, and 3D winds). Each aircraft will be cost-effective, simple, rugged, and easy to operate while performing atmospheric experiments with the required level of accuracy for scientific missions. Furthermore, the system will be designed with the intention of extending multi-aircraft functionality to other Earth observing missions through the use of a removable nose cone with well documented power and data interfaces. This further enables simple connection to the autopilot and on-board computer to enable intelligently optimized data gathering and coordination.



Advanced Technologies for Coordinated In Situ Atmospheric Sensing Project Image

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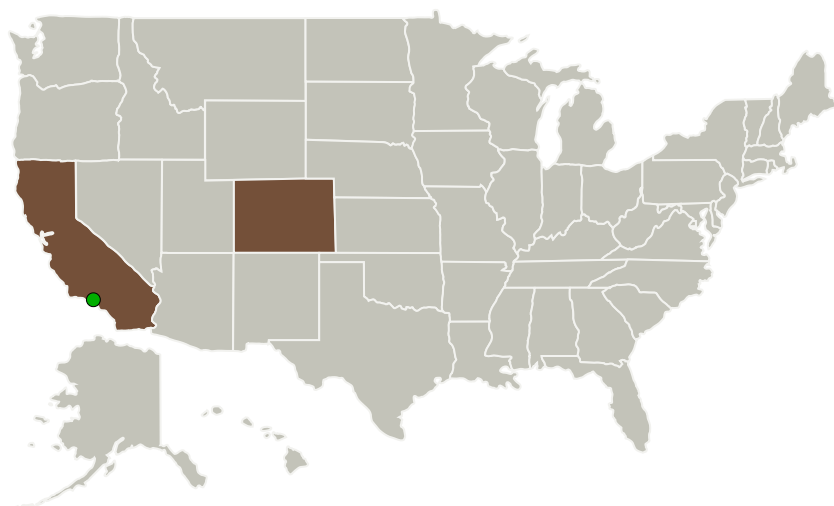
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Black Swift Technologies, LLC	Lead Organization	Industry	Boulder, Colorado
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California	Colorado
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## Project Transitions

▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137973>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Black Swift Technologies, LLC

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

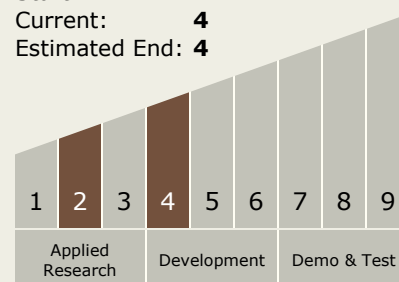
Carlos Torrez

## Principal Investigator:

Jack S Elston

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



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## Images



### Project Image

Advanced Technologies for Coordinated In Situ Atmospheric Sensing Project Image  
(<https://techport.nasa.gov/image/126827>)

## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.3 In-Situ Instruments and Sensors
    - └ TX08.3.4 Environment Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System